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Cybaeus akiensis n. sp. (Araneae: Cybaeidae) from western Honshu, Japan, with some notes on its biology

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Abstract — A new medium-sized species of *Cybaeus* (Araneae: Cybaeidae) from the westernmost part of Honshu, Japan, is described under the name *C. akiensis*. The species most resembles *C. kuramotoi* Yaginuma 1963, which is sympatrically found with *C. akiensis* n. sp., and *C. ashikitaensis* (Komatsu 1968) inhabiting Kyushu. Local species assemblage of the genus *Cybaeus* in western Honshu consists of 5 to 6 species with different body sizes. *Cybaeus akiensis* n. sp. is the second largest species in the five-species assemblage found in the distributional range of the species. Collecting records revealed that the species overwinters as both adults and juveniles and two years are needed from hatching to maturity. Silken retreat of the species bears two terminal openings and a loophole at the bottom, the latter is a feature only rarely found among Japanese species of *Cybaeus*.

Key words — Cybaeidae, *Cybaeus akiensis* n. sp., western Honshu, species assemblage, description

The genus *Cybaeus* is a group of epigeic spiders commonly found in woodlands in Japan. However, their taxonomy is still insufficient due to remarkable geographic differentiation in their genitalia. A series of faunal surveys and analyses of the geographic variation of the genus in the Chugoku district, western Honshu, have revealed occurrence of several undescribed species which can be classified into five or six different size classes in each local species assemblage. Of these, I have already described seven new species which are small to medium-sized with pale coloration (Ihara 1993, 1994). After a careful examination, I recognized another medium-sized species with dark body. I will describe here the species as new, as a part of a serial works of my taxonomic study of the genus *Cybaeus* in Japan.

Materials and Methods

Morphological examination

A total of 160 specimens of the new species collected from the Chugoku district were examined. The type specimens designated in this paper are deposited in the National Science Museum (Natural History), Tokyo. Other specimens are in my personal collection.

All the measurements were made for the specimens immersed in 80% ethanol under a stereo dissecting microscope with an ocular micrometer. Female genitalia removed from the abdomen were cleared in hot 10% KOH and 3% H_2O_2 according to the method described in Komatsu & Yaginuma (1968) to observe internal sclerotized structure.

Species recognition

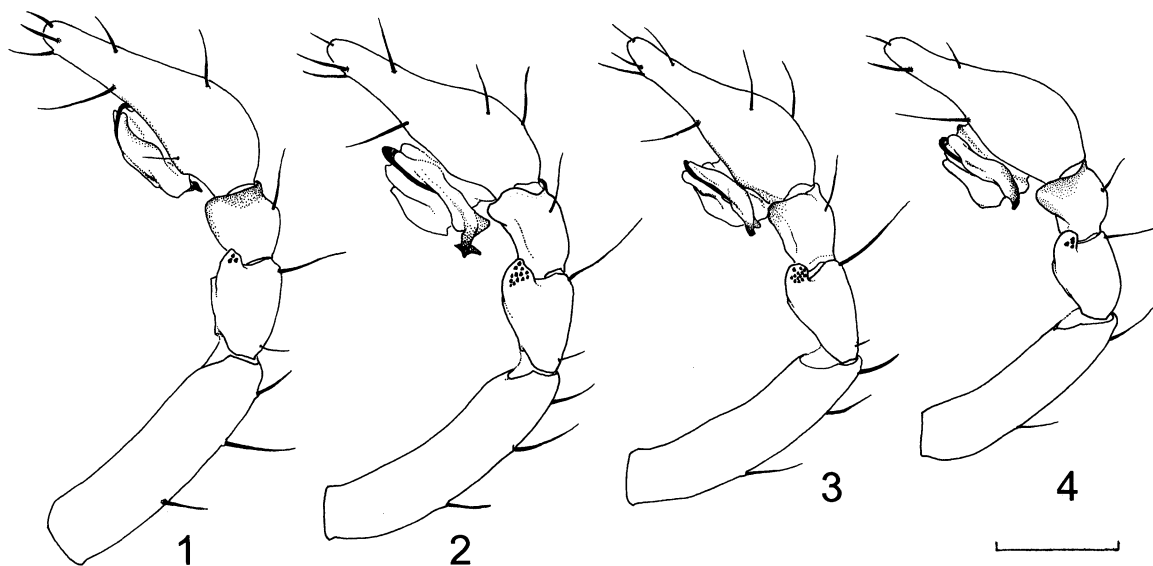
Local species assemblages of the genus *Cybaeus* in westernmost Honshu consist of 5 or 6 species which are clearly separable by many morphological differences one another. They can be recognized to be distinct biological species within each local species assemblage by their sympatry without any indication of hybridization. On the other hand, for the forms only allopatrically found, I delimited each species based on the geographical unit separated by a morphological gap from other adjacent forms. I regarded two vicarious forms lacking a distributional overlap as two distinct species, when degree of the morphological difference between the two species equals to or exceeds to that exhibited by two species sympatrically found.

Description

Cybaeus akiensis n. sp.

[Japanese name: Aki-namihagumo]
(Figs. 1, 5, 9, 10, 13, 16–17, 20–21)

Diagnosis. Medium in size and glossy dark in color compared to other species of the same local species assemblage [*Cybaeus nipponicus* (Uyemura 1938), *C. kuramotoi* Yaginuma 1963, *C. okafujii* Yaginuma 1963, and *C. hiroshimaensis* Ihara 1993]. Distinguishable from all the other species of the genus by details of the genital organs.

Description. Male (holotype). Measurements (in mm). Body length 5.10; carapace length 2.88, width 2.03, head region width 1.44; abdomen length 2.40, width 2.05; sternum length 1.35, width 1.18. Length of legs (femur/ patella/

Figs. 1–4. Male palp (left, retrolateral view). 1 *Cybaeus akiensis* n. sp. (holotype); 2 *C. kuramotoi* (Akiyoshi-dai, Yamaguchi Pref.); 3 *C. ashikitaensis* (Ashikita-cho, Kumamoto Pref.); 4 *C. okafujii* (paratype) (Scale: 0.5 mm)

tibia/ metatarsus/ tarsus; total): Leg I: 2.30/0.91/2.10/2.07/1.30; 8.68. Leg II: 2.25/0.92/1.90/1.91/1.19; 8.17. Leg III: 1.98/0.84/1.48/1.83/1.06; 7.19. Leg IV: 2.43/0.85/2.06/2.48/1.25; 9.07.

Head region wide, and higher than thoracic region (Figs. 17, 21). Anterior eye row straight as seen from front, posterior eye row almost straight as seen from above. Diameter of eyes: anterior median eyes $<$ posterior median eyes $<$ posterior lateral eyes $<$ anterior lateral eyes; anterior median eyes half to anterior lateral eyes. Ocular area wider than long, 2.3 : 1 in ratio. Clypeus shorter than median ocular area, 2 : 3 in ratio. Chelicera geniculate (Fig. 21), promargin of fung furrow with 3 teeth (median one the largest), retromargin with 5 teeth and 5 denticles, and basally with lateral condyle. Labium wider than long, 1.3 : 1 in ratio. Length of legs: $4>1>2>3$. Tibia I with 2-2-2-2 ventral spines and 2 prolateral spines; metatarsus I with 2-2-3 ventral spines, 1 prolateral spine and 1 retrolateral spine; tibia II with 2-2-1(retromargin)-2 ventral spines and 2(left) or 3(right) prolateral spines; metatarsus II 2-2-3 ventral spines, 4 prolateral spines and 1 retrolateral spine. Abdomen oval, with only simple setae. Colulus two groups of 3 or 4 setae.

Palp (Figs. 1, 5, 9). Relatively thick and short in proportion. Patella with an apophysis with 3 (left) or 4 (right) conical teeth. Tibia shorter than patella. Genital bulb oval, conductor with small triangle projection.

Coloration. Carapace reddish brown with reticulate dark grayish markings on the sides of the head and radical bands on the thorax. Chelicerae, maxillae, labium and sternum reddish brown; chelicerae darker than the others. Legs yellowish brown with dark grayish annulations. Abdomen dark gray, dorsally with pale yellow cardiac and chevron pattern.

Female. Measurements (in mm; one of the paratypes). Body length 7.15; carapace length 3.23, width 2.14, head region width 1.64; abdomen length 4.05, width 2.76; sternum length 1.46, width 1.32. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total) as follows. Leg I: 2.31/ 0.96/ 1.93/1.79/1.11; 8.10. Leg II: 2.15/0.96/1.68/1.65/1.04; 7.48. Leg III: 1.85/0.89/1.31/1.62/0.90; 6.57. Leg IV: 2.24/0.84/ 1.95/2.25/1.02; 8.30. Tibia I with 2-2-2-2 ventral spines and 2 prolateral spines; metatarsus I with 2-2-3 VS, 1 prolateral spine and 1 retrolateral spine; tibia II with 2-2-1(retromargin)-2 ventral spines and 3 prolateral spines; metatarsus II 2-2-3 ventral spines, 3 prolateral spines and 1 retrolateral spine.

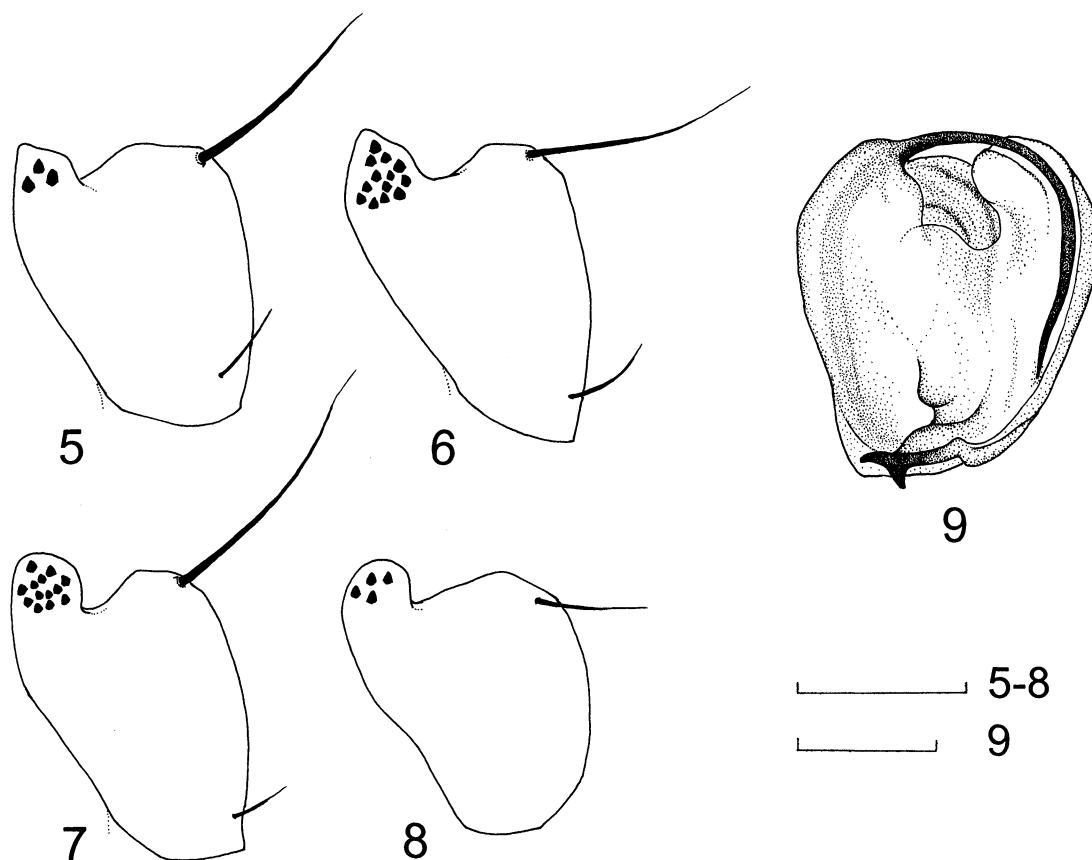
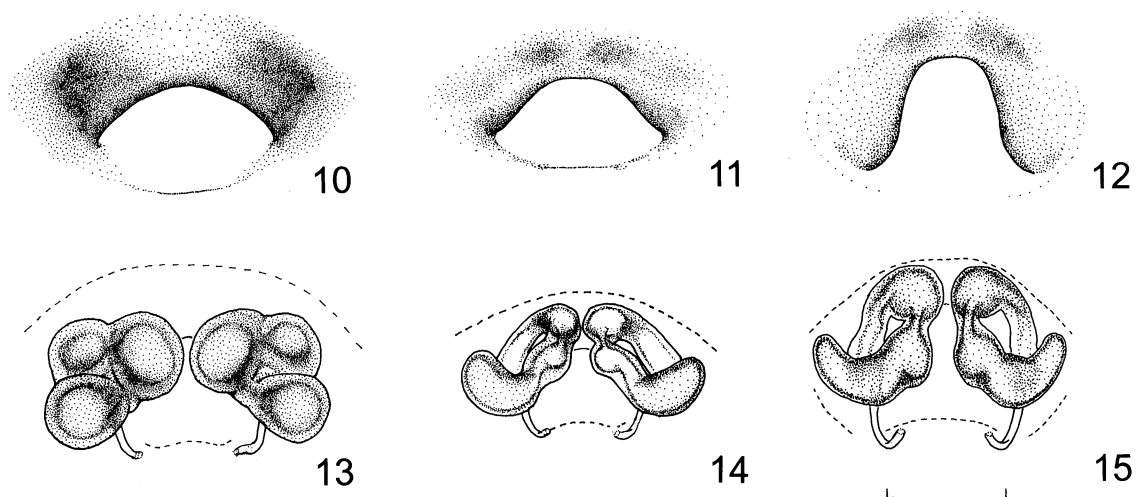
Similar to male in coloration. Carapace more robust, head region wider (Figs. 16, 20, 24). Abdomen larger and more rounded, legs shorter than those of male.

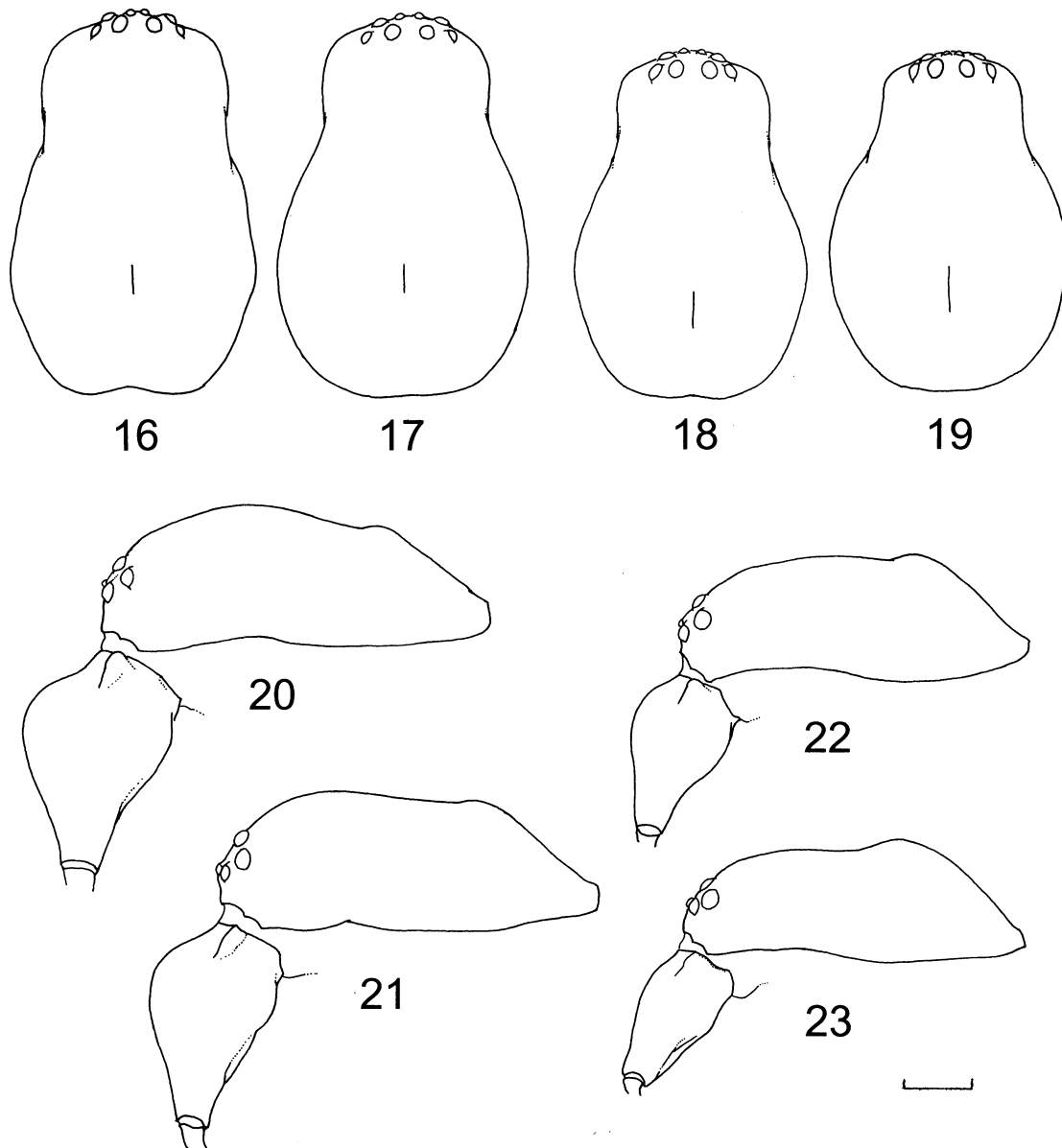
Genitalia (Figs. 10, 13). Epigynum simple, anterior rim convexly curved anteriorly. Spermathecae 3 pairs, spherical or oval, and closely connected with one another.

Variation. No prominent variation was found in the morphology of male palp and female genitalia both within and among local populations.

Range of body size (in mm, means$\pm$SD in parentheses; male n$=$40, female n$=$50): Body length, 4.7-6.0 in male, 4.4-7.1 in female; carapace length, 2.28-3.63 (3.03$\pm$0.297) in male, 2.13-3.60 (2.93$\pm$0.325) in female; carapace width, 1.62-2.62 (2.12$\pm$0.190) in male, 1.39-2.43 (1.94$\pm$0.216) in female.

Specimens examined. Type series. Haji Reservoir, Yachiyo-chô, Takata-gun, Hiroshima Pref., Japan: holotype (♂); paratypes (1♂5♀), 6-X-1999, Y. Ihara leg.

Other specimens. Collectors are as follows: YI, Yoh Ihara;

Figs. 5–9. Male palp (left). 5, 9 *Cybaeus akiensis* n. sp. (holotype); 6 *C. kuramotoi* (Akiyoshi-dai, Yamaguchi Pref.); 7 *C. ashikitaensis* (Ashikita-chô, Kumamoto Pref.); 8 *C. okafujii* (paratype) — 5-8 patella, dorsolateral view; 9 apical part of the bulb, ventral view. (Scales: 0.2 mm)

Figs. 10–15. Female genitalia. 10, 13 *Cybaeus akiensis* n. sp. (one of the paratypes); 11, 14 *C. ashikitaensis* (Ashikita-chô, Kumamoto Pref.); 12, 15 *C. kuramotoi* (Akiyoshi-dai, Yamaguchi Pref.) — 10-12 epigynum, ventral view; 13-15 internal structure, dorsal view. (Scale: 0.2 mm)

MI, Megumi Ihara; KN, Kôichi Nojima. HIROSHIMA PREF. Same locality as the type series: 1♀, 20-XI-1988, MI; 2♂3♀, 28-IX-1993, YI; 3♂9♀, 29-IX-1993, YI; 6♀, 6-X-1999, YI; 1♂1♀, 14-X-1999, YI; 2♂15♀, 4-X-2000, YI. Hiroshima-shi: Aki-ku, Ato-chô, Mt. Harayama, 1♂, 4-XI-1995, YI; Asaminami-ku, Ôtsuka, 1♀, 17-I-1990, YI; Asakita-ku, Kabe-chô, Yanase, 2♀,

Figs. 16–23. Intra- and inter-specific differentiation in carapace morphology of *Cybaeus akiensis* n. sp. (16–17, 20–21) and *C. kuramotoi* (18–19, 22–23). 16, 18, 20, 22 female; 17, 19, 21, 23, male. (Scale: 0.5 mm)

2-XI-1998, YI; Asakita-ku, Shiraki-chô, Mukaizeto, 1♂, 7-X-1990, YI; Shiraki-chô, Asehira, 1♀, 23-X-1993, YI; Shiraki-chô, Ishidô, 1♀, 24-X-1998, YI. Ôtake-shi, kuritani-chô: Mt. Mikura-dake, 3♂4♀, 7-X-1992,YI; Ushirobara, 1♀, 7-X-1992, YI. Hatsukaichi-shi: Mt. Gokurakuji, 1♀, 3-V-1991, YI; Saiki-chô, Kujima, 1♂4♀, 23-XI-1988, YI; Saiki-chô, Hanagami, 1♀, 3-XI-1993. Higashi-Hiroshima-shi: Shiwa-chô, Okuya, 1♀, 6-X-1996, YI; Takaya-chô, Ishibasami, 3♀, 2-XI-1998, YI; Saijô-chô, Senzoku-ike Pond, 1♂2♀, 3-XI-1999, YI; Saijô-chô, Mt. Ryûô, 1♀, 12-XI-2000, YI; Hachihonmatsu-chô, Yoshikawa, 1♂1♀, 3-XI-1999, YI. Kamo-gun: Daiwa-chô, Mukunashi-shimo, 1♀, 21-X-1993, YI; Kôchi-chô, Nyûno, 1♂, 25-XI-1988, YI; Toyosaka-chô, Naka-befu, 1♂, 25-X-1998, YI; Toyosaka-chô, Nôra～Asuka, 1♂1♀, 25-X-1998, YI. Saeki-gun: Yuki-chô, Shirasago, 1♂, 11-X-1988, YI; 2♂1♀, 2-XI-1988, YI; Ôno-chô, Imose～Kyôgoya, 1♀, 29-XII-1989, YI; Miyajima-chô, Mt. Misen, 1♀, 19-II-1989, YI. Yamagata-gun: Chiyoda-chô, Haji Reservoir, 1♀, 1-X-1993, YI; Chiyoda-chô, Kohori-yakushi Temple, 1♀, 5-X-2000, YI; 1♀, 15-X-2000, YI; Chiyoda-chô, Taidô-chôkoku-mura Park, 1♂1♀, 15-X-2000, MI; Togôchi-chô, Yoshiwagô, 2♂1♀, 14-X-2000, YI; Ôasa-chô, Narutaki, 1♂, 30-IX-1989, YI. Takata-gun, Yoshida-chô: Murosaka, 1♀, 29-IX-1993, YI; Yamabe, 1♀, 22-X-2000,YI; In-nai, 2♀, 22-X-2000, YI. Mukai hara-chô: Saka, Maruyama Park, 1♂3♀, 24-X-1992, YI; Aridome, 4♀, 24-X-1998, YI & MI; Hogaki, 1♀, 25-X-1998, YI. Takamiya-chô, Kurumegi, 2♀, 5-X-1993, YI. Midori-chô: Kami-yokota, Hototogisu Park, 1♂, 29-X-1992, YI; Kita, Kanaidani, 1♂5♀, 29-X-1992, YI. Toyota-gun, Yasuura-chô,

Onagobata, 2♀, 3-XI-1999, YI. Hongo-chô: Hinanai〜Obara, 2♀, 3-X-1993, YI; Hikinu, 1♂, 20-X-1993, YI. SHIMANE PREF. Kanoashi-gun, Muikaichi-machi: Mt. Mottagadake, 1♀, 10-XII-1989, KN; Kôji, 1♀, 9-IV-1991, YI. Naka-gun, Kanagi-chô: Imafuku, 1♂1♀, 26-X-1993, YI; Oibara, 1♀, 26-X-1993, YI. Misumi-chô, Ino, Ichiba, 5♀, 26-X-1993, YI. Yasaka-mura, N agayasuhongô, 2♀, 27-X-1993, YI. Mino-gun, Mito-chô, Kubara, 1♂2♀, 20-X-1992, YI. Ôchi-gun, Sakurae-chô, Nagatani, 1♂, 31-X-1999, YI. Iwami-chô, Hinui, 1♀, 23-IX-1996, YI. YAMAGUCHI PREF. Iwakuni-shi, Shiroyama, 1♀, 15-X-1990, YI. Tokuyama-shi, Nakazu, 2♀, 31-XII-1988, YI. Kuga-gun, Nishiki-chô, Jakuji-kyô Gorge, 2♂2♀, 20-X-2002, YI. Tsuno-gun, Kano-chô, Ôshio, 2♂, 21-X-1994, YI. Abu-gun, A bu-chô: Kami-tôgô, 1♂1♀, 10-XII-1989, KN; Mt. Shirasu, 1♀, 10-XII-1989, YI. Fukue-son, Hirawarabi-dai, 1♂, 11-X-1991, YI. Mine-gun, Mitô-chô, Myôjiki Pass, 1♀, 1-X-1989, YI.

Distribution. Westernmost Honshu, Japan (Fig. 25).

This species is distributed in a restricted area covering western part of Hiroshima Prefecture, western part of Shimane Prefecture, and Yamaguchi Prefecture. Figure 25 represents eastern boundary of the distributional range of the species rather accurately. Whether the species is also distributed in Shikoku or not is uncertain due to my insufficient collecting efforts of the genus *Cybaeus* in Shikoku. It is very likely that the species range does not extend to Kyushu where two other medium-sized species, *C. ashikitaensis* and *C. kuramotoi* (or some other closely related species) are found.

Remarks. Comparison of some diagnostic characters of *C. akiensis* n. sp. and three related species are summarized in Table 1.

Cybaeus akiensis most resembles *C. kuramotoi* in body size and coloration within the same local species assemblage (*C. akiensis, C. nipponicus, C. kuramotoi, C. okafujii,* and *C. hiroshimaensis*). However, this species can be distinguished from *C. kuramotoi* by the shape of carapace (compare Figs. 16–17 and 20–21 with 18–19 and 22–23), male palp (cf. Figs. 1 and 2) and female genitalia (cf. Figs. 10 and 12, 13 and 15). This species also resembles *C. ashikitaensis* particularly in female. Epigyna of the both species closely resemble in appearance one another (compare Figs. 10 and 11). However, they are distinguishable in the internal structure of the genitalia (cf. Figs. 13 and 14). Furthermore, their distributions are completely separated into two different areas, Honshu and Kyushu (Fig. 25). Male palp of this species also resembles that of *Cybaeus okafujii* in the shape of cymbium, tibia, and patellal apophysis with several blackish brown teeth (Figs. 1, 4, 5, 8). However, this species can be easily distinguished from *C. okafujii* by coloration of the body (*C. okafujii* has a pale yellow brown body whereas in *C. akiensis* the body is glossy dark brown) and body size (cf. Fig. 26).

Local species assemblages of the genus *Cybaeus* in westernmost Honshu consist of several species. For example, in western part of Hiroshima Prefecture, the assemblage is comprized of 5 species: *C. akiensis, C. nipponicus, C. kuramotoi, C. okafujii*, and *C. hiroshimaensis* (Ihara 1993). They are morphologically and biologically distinct species, which are clearly diverged in body size as shown in Fig. 26.

Natural history. Juveniles of this species can be seen year round, whereas adults have been collected only from late September to May. Both adults and juveniles, which are considered to represent two different generations, can be collected at the same time during the season. Furthermore, in the juveniles collected in summer, two groups differing enormously in size are recognized. These observations suggest that two years are needed for *C. akiensis* to mature.

In a suitably wooded habitat *C. akiensis* is often found inside the silken retreat constructed on the soiled wall of the overhang rocks protruded on the roadside slope along the forest road. The retreats are also found frequently on undersurface of rocks and rotting logs on the humid forest floor. Most of the Japanese *Cybaeus* species build a silken

Table 1. Comparison of some diagnostic characters of four species of the genus *Cybaeus*

	C. akiensis	*C. kuramotoi*	*C. ashikitaensis*	*C.okafujii*
Body size	Medium	Medium	Medium	Rather small
Coloration	Dark	Dark	Dark	Pale
Highest region of carapace	Head region	Thoracic region	Thoracic region	Thoracic region
Ventral spines of metatarsus I	2-2-3	2-2-2	2-2-2	2-2-2
Male palpal tibia	Short	Long	Intermediate	Short
Conical teeth of patellal apophysis of male palp	3-6	8-18	9-22	3-8
Epigynum (Gonopore)	Slit	Concave	Slightly concave	anterior rim swollen
Distribution	Westernmost Honshu	Westernmost Honshu Kyushu	Kyushu	Westernmost Honshu
Sympatric / Allopatric with *C. akiensis*	—	Sympatric	Allopatric	Sympatric
Retreat	Two openings with an additional loophole	Two openings	Two openings	Two openings

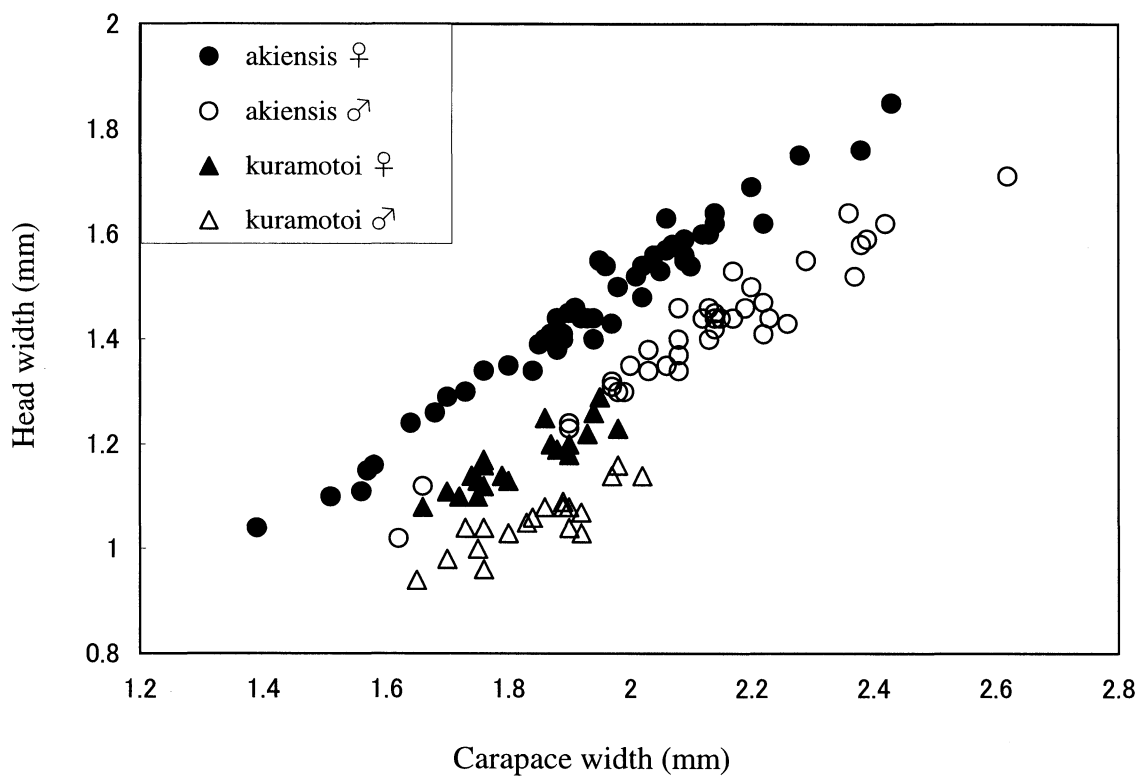



Fig. 24. Relationship between carapace width and head width in *Cybaeus akiensis* n. sp. and *C. kuramotoi.*

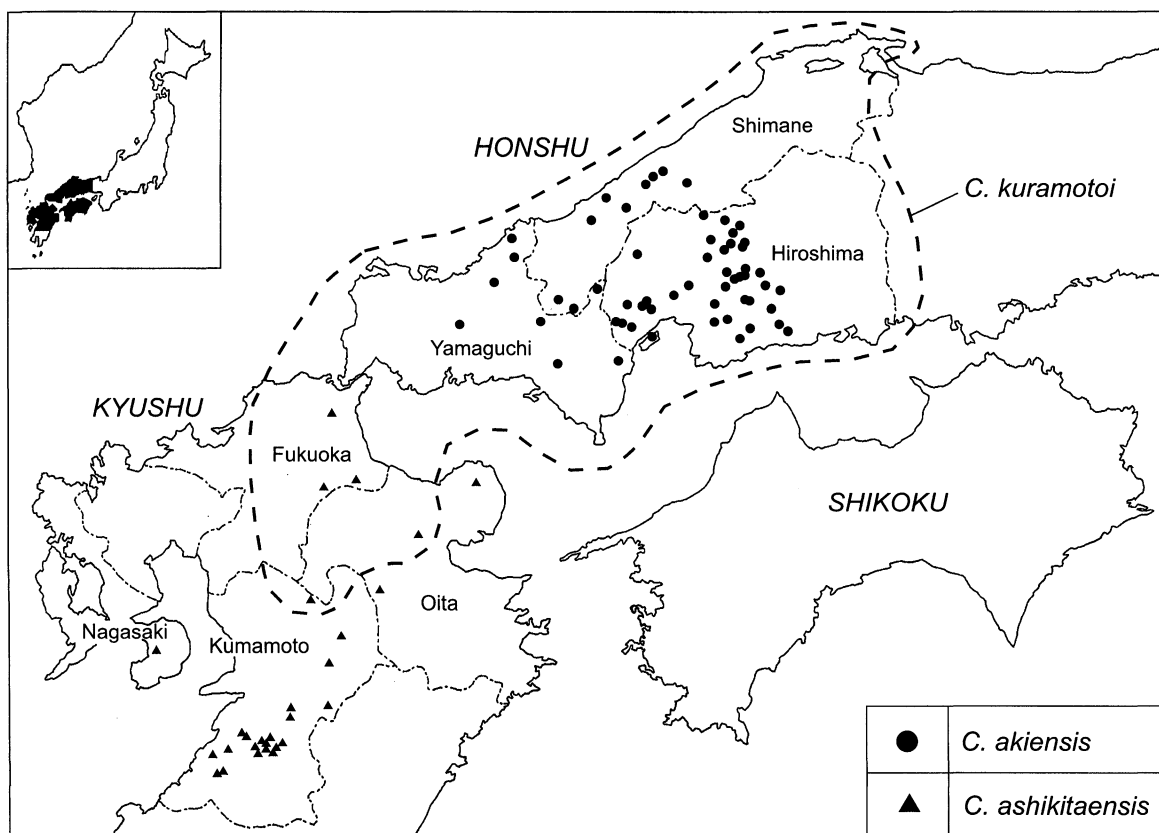



Fig. 25. Distribution of *Cybaeus akiensis* n. sp. and *C. ashikitaensis*. *C. kuramotoi* is distributed in the range surrounded with the dashed line.

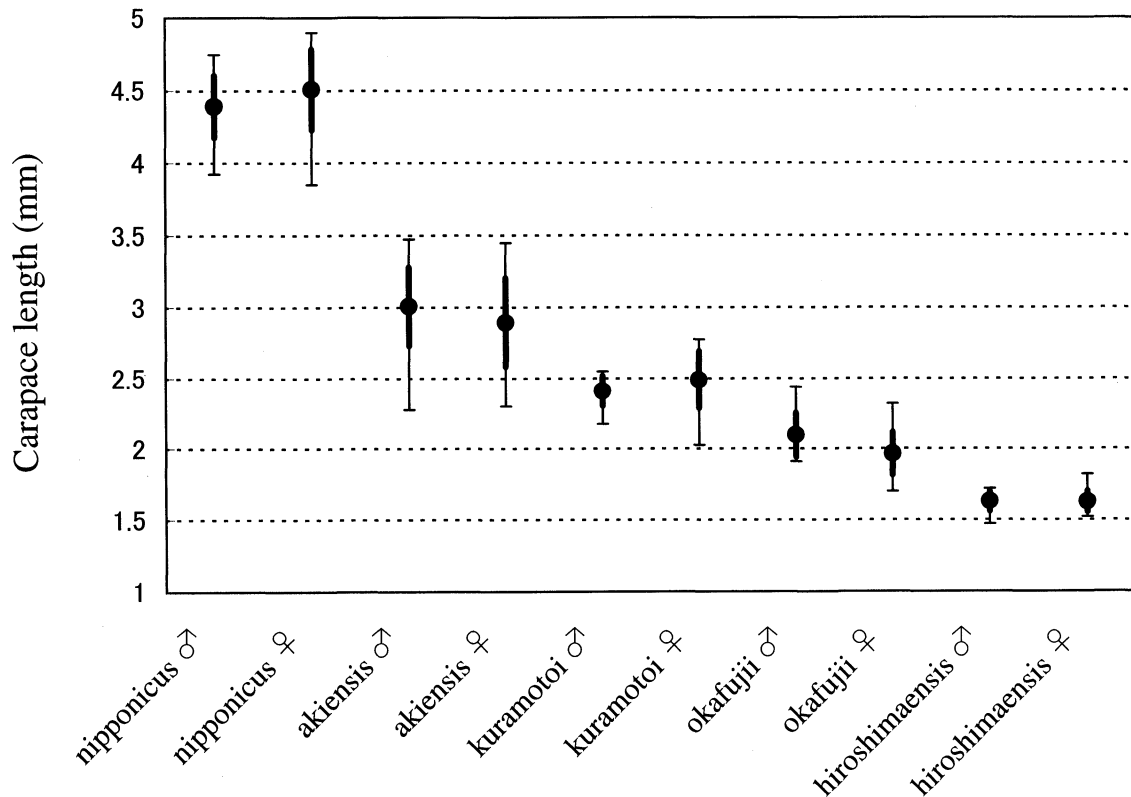



Fig. 26. Interspecific difference in carapace length among five species of the *Cybaeus* assemblage in western part of Hiroshima Prefecture, Chugoku District, Honshu. Measurements were made on arbitrarily selected 20 males and 20 females for each species. (means±SD, max.-min.)

tube-like retreat with two or three terminal openings (V or Y letter-shaped types in Komatsu 1961). The retreat of this species has two openings resembling those of *C. kuramotoi* and *C. okafujii* in appearance. However, the retreat also bears a loophole at the bottom, and the loophole leads to crevice behind the retreat.

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旧北区東部のコモリグモ科の調査．オオアシコモリグモ属 *falcata* 種群の近縁3種（pp. 43–50）

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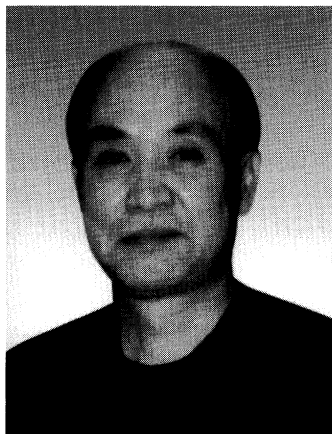
オオアシコモリグモ属の *Pardosa azerifalcata* sp. n.（アゼルバイジャン南東部），*P. jergeniensis* Ponomarev 1979（カスピ海北東部）と *P. falcata* Schenkel 1963（中国北部とモンゴル）の3種は，一つの近縁種群 *falcata* 種群を構成する．これら3種の記載および再記載をおこなった．イランから知られる *P. donabila* Roewer 1955 も本種群の一員かもしれない．*P. crucifera* Schenkel 1963 は *P. falcata* の新参シノニムである．*P. falcata* をモンゴルから初めて記録した．（和訳：編集委員会）

本州西部から得られたナミハグモ科の新種 *Cybaeus akiensis* およびその生態に関する知見（pp. 51–57）

井原　庸（〒730-8631 広島市中区広瀬北町9-1，広島県環境保健協会）

本州西部に分布するナミハグモ科の新種を記載した．*Cybaeus akiensis* n. sp. アキナミハグモ（新称）は中型のナミハグモで，同所的にみられる *C. kuramotoi* ナガトナミハグモや，九州に分布する *C. ashikitaensis* アシキタナミハグモとよく似ている．本州西部では，同一地域に生息するナミハグモ属は，体サイズの異なる5，6種で構成される．*C. akiensis* は，そのなかで2番目に大型の種である．採集状況から，本種は成体と幼体のいずれも越冬し，成熟するまでに2年を要することがわかった．また，日本産のナミハグモの多くは両端に2つの出入口のあるトンネル状の住居を作るが，本種の住居は両端の開口部だけでなく内部に逃げ道をもつ．

訃　報　Obituaries

藤井靖浩さんを悼む

12月15日（2002年）に新海栄一さんから連絡を受けて，私は絶句した．14日に藤井靖浩さんが亡くなられたという知らせである．夏頃までメールのやり取りをしていたので，とても信じられない．17日のお葬式には講義2つを休講にして，何が何でも行くつもりだったが，どうしても出席しなければならない会議があって，行くことができなかった．

そこで，年が明けて新宿で行われた分類学会連合のシンポの帰りに，お焼香をしに埼玉県日高市のご自宅に伺った．奥さんの話によると，彼は子供のときに肺炎を患ったことがあり，その後も肺のレントゲンで引っかかることがあったという．昨年の春にも肺に翳があるというので精密検査をすすめられたのだそうだが，「風邪だろう」と放置していた．その後体調をこわして入院し，肺癌の末期と診断された．

本人は絶対に復帰するつもりで，「今の時点で最善の治療は何か？」など，かなり踏み込んだ話を医者とやっていたらしい．12月のはじめには一時帰宅し，年賀状も書いていた．「今年いっぱいはもつだろう」と医者が言っていたらしいが，亡くなる数日前に不整脈が出て，検査の最中に血管が破裂したらしい．入院して50日．あまりにもあっけない最後であった．

藤井さんは蜘蛛学会の古い会員で，私とは大学院生のときからの30年以上の長い付き合いであった．彼は東京教育大学（現，つくば大学），私は京都大学と，大学は異なるが年齢も学年も同じ．ともにクモの生態学を志しており，その当時クモの生態を調べている研究者は少なかったから，私たちはすぐに仲良くなった．頭が切れ，スマートで，若くして結婚した彼に対して，私は嫉妬に似た感情を持っていたかもしれない．

蜘蛛学会との関わりでは，彼は1981年から83年までActaの編集委員，88年から90年まで評議員，88年から92年までAtypusの編集委員を務めた．私も同じ時期に評議員を務め，会則や諸規程の見直しなどの作業をいっしょにやって，「会員数の減少をいかにしてくい止めるか？」など，蜘蛛学会のあり方について種々議論をした覚えがある．

彼は家庭では，面倒見の良い父親であり，夫であった．「亡くなってはじめて，あれもこれもびっくりするほど多くのことを夫がやってくれていたと，実感しています」とは，奥さんの弁である．次男が生れ，やがて障害児であることが分かった時点から，「土・日は必ず家にいて次男の相手をする」と，彼は自分で決めた．「私が観るから，研究でも学会でも行ってきて」と奥さんは言っていたようだが，彼はガンとして自分の意志を貫いた．この頃から彼の足は，蜘蛛学会から少しずつ遠のいていった．

研究者としての彼は，完全主義者であった．コモリグモ類の生態的特性に関する膨大なデータを集めていたが，書かれた論文の数は多くない（論文リスト参照）．ちょっとでも不完全なところがあると，放っておけずに新たなデータを取ろうとするタイプである．フィールドは埼玉の自宅の近くであり，彼の勤務地は東京だったから，休日にしかデータを取ることができなかったはずである．それでも，1970年代と80年代には，彼は